

### **Remarks**

Reconsideration of the application is respectfully requested in view of the foregoing amendments and following remarks. Claims 1-45 were pending. Claims 1, 5, 6, 8, 10, 14, 17, 19-21, 24, 27, 29, 31, 36, 39-42, and 44 are amended. Claims 3 and 4 have been canceled. New claim 46 has been added to the application. No new matter is added by applicants' requested amendments. Following entry of this amendment, claims 1, 2, and 5-46 are pending.

#### ***I. Double Patenting***

Claims 1-45 are provisionally rejected for nonstatutory obviousness-type double patenting as allegedly being unpatentable over claims 1-26 of co-pending Application No. 11/627,273 (the '273 application). Applicants disagree and request that the obviousness-type double patenting rejection be withdrawn.

A nonstatutory obviousness-type double patenting rejection is appropriate when at least one examined application claim is not patentably distinct from the reference claim(s) because the application claim is either anticipated by, or would have been obvious over, the reference claim(s). MPEP § 804. However, the present claims are neither anticipated by, nor obvious over, the '273 claims.

Applicants note that the '273 application has received a Restriction Requirement. In response to the Restriction Requirement, claims 1- 23 were elected, and claims 24-26 were canceled. The '273 application has not been examined yet on the merits.

Amended claim 1 of the present application is directed to a photonic material comprising a core and an envelope and recites, in part "said envelope comprising a suitably selected organic stabilizing layer overlying said core, wherein said organic stabilizing layer comprises a functional group-presenting material and at least one functional group, and wherein said at least one functional group binds at least one luminescent ion." No claim in the '273 application recites an organic stabilizing layer including a functional group that binds at least one luminescent ion. Thus, claim 1 is neither anticipated by, nor obvious over, the '273 claims.

Claims 2-41 depend directly or indirectly from claim 1. Accordingly, claims 2-41 also are neither anticipated by, nor obvious over, the '273 claims for at least the same reasons, as well as based on each claim's unique and non-obvious combination of features. For example, claim 7 recites an organic stabilizing layer comprising a ligand suitable for ligand exchange reactions.

None of the claims in the '273 application recite an organic stabilizing layer having ligands suitable for exchange reactions.

Claim 10 depends from claim 1 and recites an organic stabilizing layer comprising "hole conductors, electron conductors, or a suitably selected combination of hole conductors and electron conductors." Claims 11-14 depend directly or indirectly from claim 10 and recite further features of the hole and/or electron conductors. None of the claims in the '273 application recite an organic stabilizing layer comprising hole and/or electron conductors.

Claim 23 depends indirectly from claim 1 and recites that the inorganic material is a semiconductor. Claims 24 and 25 depend from claim 23. Claim 24 recites specific semiconductors. Claim 25 recites a particular combination of a semiconductor and luminescent ion. The '273 application has no claims directed to a core comprising an inorganic semiconductor material.

Claim 29 depends from claim 1 and recites, in part, "further comprising a suitably inorganic shell for shielding said core from quenchers, said inorganic shell located between said core and said envelope." Claims 30-41 depend directly or indirectly from claim 29 and recite additional features of the shell. None of the claims in the '273 application recite a photonic material comprising a shell between a core and an outer organic layer.

Claims 42-45 are method claims. The '273 application does not include method claims. Thus, claims 42-45 are neither anticipated by, nor obvious over, the claims in the '273 application.

Additionally, the present application is the earlier-filed application. Accordingly, Applicants request that any further requirement to file a terminal disclaimer be held in abeyance until such time as the '273 application receives a Notice of Allowance, or alternatively, that the nonstatutory obviousness-type double patenting rejection be applied against the '273 application and the present application be allowed to issue without need of a terminal disclaimer, as provided by MPEP § 804.

## ***II. Claim Rejections – 35 U.S.C. § 102(b)/103(a)***

Claims 1-45 are rejected under 35 U.S.C. 102(b) as allegedly being anticipated by or, in the alternative, rejected under 35 U.S.C. 103(a) as allegedly being obvious over U.S. Patent No. 6,180,029 to Hampden-Smith *et al.* (Hampden-Smith). Applicants disagree and request that the rejection be withdrawn.

Amended claim 1 is directed to a photonic material comprising a core and an envelope. Claim 1 recites, in part "said envelope comprising a suitably selected organic stabilizing layer overlying said core, wherein said organic stabilizing layer comprises a functional group-presenting material and at least one functional group that binds at least one luminescent ion."

Hampden-Smith discloses oxygen-containing phosphor powders, *i.e.*, "those which incorporate a host material that is an oxygen-containing compound, including metal oxides, silicates, borates, or aluminates." (Col. 5, ll. 16-20.) The host material can be doped with an activator ion. (Col. 34, ll. 36-37.) The phosphor particles may be coated with an organic compound to reduce degradation of the phosphor material. (Col. 38, ll. 5-16.) Suitable organic compounds are "PMMA (polymethylmethacrylate), polystyrene or similar organic compounds, including surfactants." (Col. 38, ll. 65-67.) Hampden-Smith also discloses coating the particles with a functionalized organo silane such as halo- or amino-silanes "to modify and control the hydrophobicity and hydrophilicity of the phosphor powders." (Col. 39, ll. 14-19.) However, Hampden-Smith does not disclose an organic stabilizing layer comprising a functional group that binds at least one luminescent ion. Thus, claim 1 is not anticipated by Hampden-Smith.

Claims 2-41 depend directly or indirectly from claim 1 and are not anticipated by Hampden-Smith for the same reasons as claim 1, and further in view of the patentable combinations of features recited in these claims. For example, claim 7 recites an organic stabilizing layer having a ligand wherein the ligand "is selected to be suitable for ligand exchange reactions." Hampden-Smith does not disclose organic coatings having ligands suitable for ligand exchange reactions.

Claim 10 recites a photonic material having an organic stabilizing layer that "further comprises hole conductors, electron conductors or a suitably selected combination of hole conductors and electron conductors." Hampden-Smith does not disclose such organic coatings. Instead, Hampden-Smith discloses organic coatings such as PMMA (polymethylmethacrylate), polystyrene or similar compounds, surfactants, and functionalized organo-silanes. (Col. 38, line 65 to col. 39, line 18).

Claim 14 recites an electron conductor coating selected from "oxadizoles, 1,2,4-triazoles, 1,3,5-triazines, quinoxalines, oligo- and polythiophenes and oligo-and polypyrroles." Hampden-Smith does not disclose coatings selected from these classes of compounds.

Claim 17 recites a photonic material having an envelope "suitably selected to permit modification of said functional groups." Hampden-Smith does not teach or suggest envelopes comprising an organic layer that is selected to permit modification of its functional groups.

Claims 21 and 41 recite in part, "said photonic material emits in the near-infrared wavelength range." In contrast, Hampden-Smith prepares phosphors "which are capable of emitting radiation in the visible or ultraviolet spectral range upon excitation." (Col. 33, ll. 57-59.) Hampden-Smith does not teach or suggest photonic materials that emit in the near-infrared wavelength range.

Claim 25 recites a photonic material having a core comprising the semiconductor  $\text{Al}_2\text{S}_3$  and including Eu as the luminescent ion. Hampden-Smith does not teach such a combination. The phosphors in Hampden-Smith are limited to oxygen-containing phosphors.

Claim 28 recites a photonic material having a core comprising the insulator  $\text{LaF}_3$ . Hampden-Smith discloses only oxygen-containing phosphors.

Amended claim 42 recites a method of preparing a photonic material comprising preparing a nanoparticle core and enveloping the core with an organic material comprising "a functional group-presenting material and at least one functional group that binds the suitably luminescent ion." Hampden-Smith discloses coating phosphor particles with a metal, a non-metallic compound or an organic compound. (Col. 38, ll. 5-11.) However, Hampden-Smith does not disclose coating particles with an organic material comprising a functional group that binds a luminescent ion. Thus, claim 42 is not anticipated by Hampden-Smith.

Claims 43-45 depend from claim 42 and also are not anticipated by Hampden-Smith for the same reasons as claim 42, and further in view of the patentable combinations of features recited in these claims. For example, claim 44 recites an organic coating comprising functional groups wherein "said functional groups are exchanged." Hampden-Smith does not teach or suggest an organic coating having functional groups and exchanging the functional groups.

Applicants believe the rejection of claims 1-45 under 35 U.S.C. § 103(a) is improper. To establish a *prima facie* case of obviousness, the Office action must clearly articulate why the claimed invention would have been obvious. The Federal Circuit has stated that "rejections on obviousness cannot be sustained with mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006). (MPEP § 2142.) The Examiner provides no reasoning to support an obviousness rejection of claims 1-45



over Hampden-Smith. Thus, a *prima facie* case of obviousness has not been established, and for this reason alone Applicants respectfully request withdrawal of the rejection.

Nonetheless, Applicants believe claims 1-45 are not obvious in view of Hampden-Smith. Independent claim 1 recites, in part "said envelope comprising a suitably selected organic stabilizing layer overlying said core, wherein said organic stabilizing layer comprises a functional group-presenting material having at least one functional group that binds at least one luminescent ion."

As previously discussed, Hampden-Smith does not disclose an organic layer comprising a functional group that binds at least one luminescent ion. The coatings disclosed by Hampden-Smith are selected to reduce degradation of the phosphor material, create a diffusion barrier, provide a semi-conductive oxide coating, include a pigment or material that alters the light characteristics of the phosphor, aid in dispersion and/or suspension of the particles, and prevent corrosion of the particles. (Col. 38, line 12 to col. 39, line 31.) There is no teaching to select an organic coating having a functional group that binds to a luminescent ion.

For at least the reasons discussed above, claim 1 is allowable over Hampden-Smith. Applicants request withdrawal of the rejection.

Claims 2-41 depend directly or indirectly from claim 1 and are allowable over the cited art for at least the same reasons set forth in relation to claim 1, as well as based on each claim's unique and non-obvious combination of features. For example, claim 7 recites that the organic stabilizing layer comprises a ligand selected to be suitable for ligand exchange reactions. There is no teaching in Hampden-Smith to select an organic coating comprising a ligand suitable for ligand exchange reactions.

Claim 10 recites an organic stabilizing layer comprising "one of hole conductors, electron conductors or a suitably selected combination of hole conductors and electron conductors." Claims 11-14 depend directly or indirectly from claim 10 and further define the hole and electron conductors. Hampden-Smith does not teach selecting an organic layer comprising hole and/or electron conductors.

Claim 17 recites that the envelope is "suitably selected to permit modification of said functional groups." There is no teaching in Hampden-Smith to select an envelope comprising an organic layer that permits modification of functional groups within the organic layer.

Claims 21 and 41 recite in part, "said photonic material emits in the near-infrared wavelength range." In contrast, Hampden-Smith discloses only phosphors "which are capable of

emitting radiation in the visible or ultraviolet spectral range upon excitation." (Col. 33, ll. 57-59.) Hampden-Smith does not teach or suggest photonic material that emit in the near-infrared range. In contrast, Hampden-Smith discloses only phosphors "which are capable of emitting radiation in the visible or ultraviolet

Claim 25 is directed to a core comprising the semiconductor  $\text{Al}_2\text{S}_3$  and Eu. Claim 28 is directed to a core comprising the insulator  $\text{LaF}_3$ . Hampden-Smith discloses only cores comprising oxygen-containing phosphor compounds. There is no teaching or suggestion in Hampden-Smith to select a core comprising a compound that does not include oxygen.

Independent claim 42 recites a method of preparing a photonic material comprising preparing a nanoparticle core and enveloping the core with an organic material comprising "a functional group-presenting material and at least one functional group that binds the suitably luminescent ion." As previously discussed, Hampden-Smith does not teach coating phosphor particles with an organic material comprising a functional group that binds a luminescent ion.

Hampden-Smith does disclose coating a phosphor particle with a monolayer coating "formed by the reaction of an organic or an inorganic molecule with the surface of the phosphor particles to form a coating layer that is essentially one molecular layer thick." (Col. 39, ll. 11-14.) However, the fact that a claimed species or subgenus is encompassed by a prior art genus is not sufficient by itself to establish a *prima facie* case of obviousness. *In re Baird*, 16 F.3d 380, 382, 29 USPQ2d 1550, 1552 (Fed. Cir. 1994). MPEP § 2144.08. Given the enormous number of species encompassed by "an organic molecule," it would not have been obvious to a person of ordinary skill in the art to select an organic compound comprising a functional group-presenting material and at least one functional group that binds a luminescent ion. Furthermore, Hampden-Smith provides no guidance in selecting an organic coating other than the selection of a functionalized organo silane, such as halo- or amino-silanes, which "can be used to modify and control the hydrophobicity and hydrophilicity of the phosphor powders." (Col. 39, ll. 15-19.)

For at least the reasons discussed above, claim 42 is allowable over the cited prior art. Applicants request withdrawal of the rejection.

Claims 43-45 depend directly or indirectly from claim 42 and are allowable for at least the same reasons set forth in relation to claim 42, as well as based on each claim's unique and non-obvious combination of features. For example, claim 44 recites, in part, "said functional groups are exchanged." Hampden-Smith does not teach exchanging functional groups in an organic coating.

**III. New Claims**

New claim 46 has been added. Claim 46 recites, in part, "an envelope comprising a suitably selected organic stabilizing layer overlying the core, wherein the organic stabilizing layer has at least one functional group that binds the at least one lanthanide ion, the organic stabilizing layer further comprising aromatic amine hole conductors, electron conductors, or a suitably selected combination of aromatic amine hole conductors and electron conductors, wherein the electron conductors are oxadiazoles, 1,2,4-triazoles, 1,3,5-triazines, quinoxalines, oligothiophenes, polythiophenes, oligopyrroles, or polypyrroles." Support for this claim is found throughout the specification, *e.g.*, at pp. 5-8.

Claim 46 is neither anticipated by, nor obvious in view of, Hampden-Smith. Hampden-Smith does not disclose an organic layer comprising a functional group that binds at least one lanthanide ion. Nor does Hampden-Smith disclose an organic layer comprising aromatic amine hole conductors and/or electron conductors selected from oxadiazoles, 1,2,4-triazoles, 1,3,5-triazines, quinoxalines, oligothiophenes, polythiophenes, oligopyrroles, or polypyrroles.


**Conclusion**

The present claims are in condition for allowance, and such action is respectfully requested. If any issues remain prior to allowance, the Examiner is formally requested to contact the undersigned prior to issuance of the next Office action, in order to arrange a telephonic interview.

Respectfully submitted,

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